

10.5.3.9

EE23BTECH11063 - Vemula Siddhartha

Question:

If the sum of first 7 terms of an AP is 49 and that of 17 terms is 289, find the sum of first n terms.

Substituting the values of a and d :

$$S_n = \frac{n}{2} (2(1) + (n-1)(2))$$

$$S_n = n(1 + n - 1)$$

$$S_n = n^2 \quad (6)$$

Solution:

The sum of first r terms of an Arithmetic Progression (AP) S_r , whose first term is a and common difference is d is:

$$S_r = \frac{r}{2} (2a + (r-1)d) \quad (1)$$

Let the given AP have first term a and common difference d .

Given, the sum of first 7 terms of the AP is 49.

$$S_7 = 49$$

$$49 = \frac{7}{2} (2a + (7-1)d)$$

$$49 = \frac{7}{2} (2a + 6d)$$

$$a + 3d = 7 \quad (2)$$

Also given, the sum of first 17 terms of the AP is 289.

$$S_{17} = 289$$

$$289 = \frac{17}{2} (2a + (17-1)d)$$

$$289 = \frac{17}{2} (2a + 16d)$$

$$a + 8d = 17 \quad (3)$$

Subtracting equation 2 from equation 3 we get:

$$5d = 10$$

$$d = 2 \quad (4)$$

Substituting the value of d in equation 2 we get:

$$a + 6 = 7$$

$$a = 1 \quad (5)$$

The sum of first n terms of the AP is:

$$S_n = \frac{n}{2} (2a + (n-1)d)$$